① Use synthetic division to verify the upper + lower bounds (p.121) of the real zeros of $f(x)=2x^3-3x^2-12x+8$

upper bound $x=4$ lower bound $x=-3$

$$\begin{array}{r|rrrr} 4 & 2 & -3 & -12 & 8 \\ & & 8 & 20 & 32 \\ \hline & 2 & 5 & 8 & 40 \end{array}$$

pos

pos

$$\begin{array}{r|rrrr} -3 & 2 & -3 & -12 & 8 \\ & & -6 & 27 & -45 \\ \hline & 2 & -9 & 15 & -37 \end{array}$$

neg.

alt.

② No calculator, sketch a graph of $f(x)=-\frac{1}{3}(x+1)(x-2)^2$

$$f(x) = -\frac{1}{3}(x+1)(x-2)^2$$

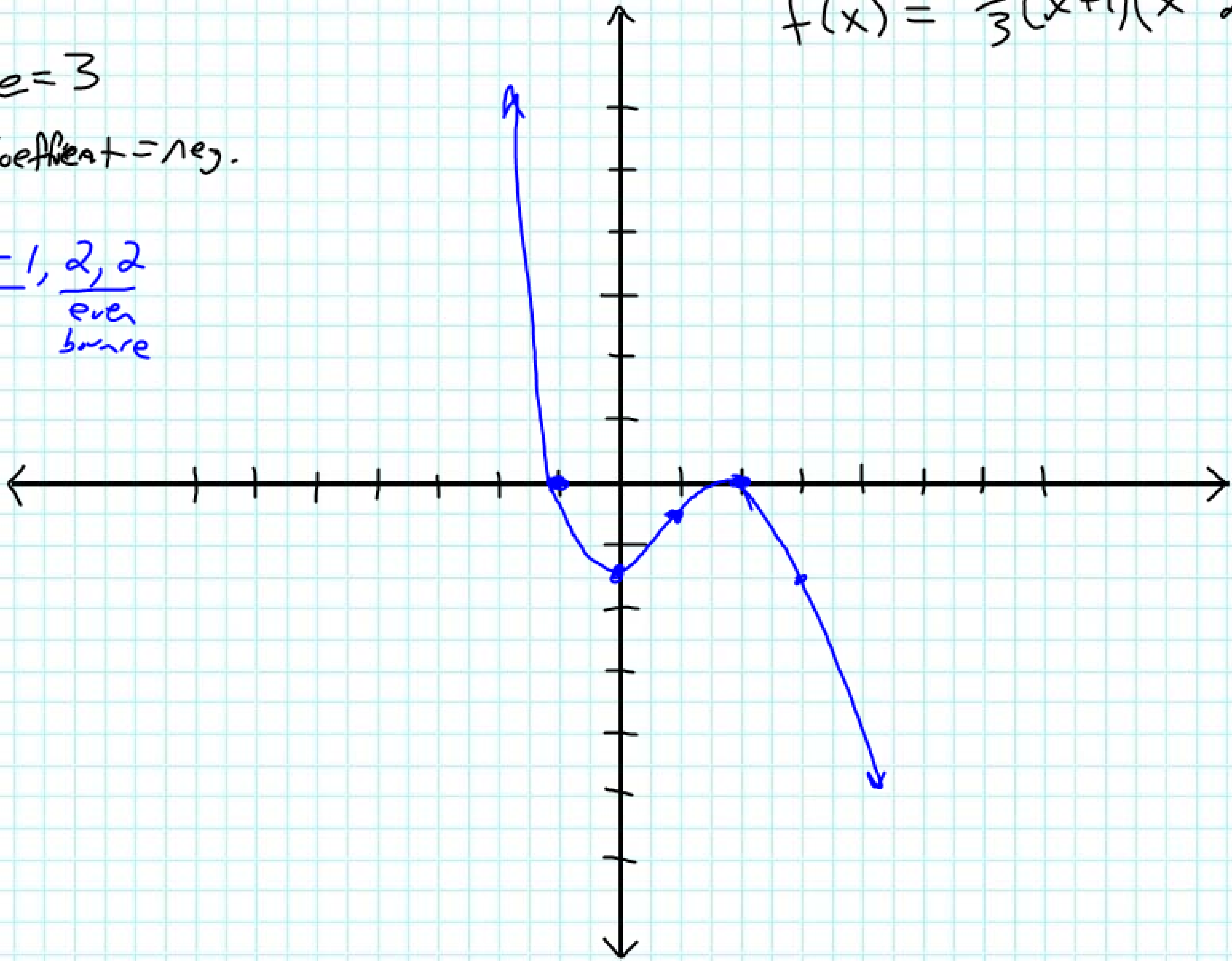
Degree = 3

Leading Coefficent = neg.

Zeros = $\underbrace{-1}_{\text{odd}}, \underbrace{2, 2}_{\text{even}}$

odd
cross

even
bounce



Turn In

- 2.1 #1-8, 11, 12, 13-26(3), 27-33(odd)
  35-38(2), 39-42(2)

- 2.1 #57-59(2), 61 + 62
  Quadratic Review worksheet

- 2.2 #1-6(vocab), #1-8, 9-12(1), 17-24(2),
  28, 32, 35, 38, 45, 49, 53-60(1),
  61-72(2)

- 2.3 #1-4, 8, 13-15, 31, 35, 39

- 2.3 #47, 49, 50, 52, 53, 68

- 2.4 #1-5(vocab), #1-6, 11, 15-17, 25, 26, 29,
  30, 31, 34, 37-41, 47, 50, 65, 67-72(4)

So far...

p.101 Even/odd functions

p.101 Leading Coefficient

p.104 Even/odd Multiplicity

p.107 Intermediate Value Thm.

p.112 Long ÷ of polynomials

p.115 Synthetic division

p.116 Remainder Thm.

p.118 Rational Zero Test

p.120 Descarte's Rule of Signs

p.121 Upper/lower bounds

Sect. 2.4 Imaginary Numbers

$$\begin{array}{r|rrrr} 2 & 3 & -5 & 2 & 8 \\ & & 6 & 2 & 8 \\ \hline & 3 & 1 & 4 & 16 \end{array}$$

$f(2) = 16$

Find the zeros of each polynomial

① $f(x) = x^4 - 5x^3 + 15x^2 - 45x + 54$

② $f(x) = x^4 + 2x^3 + 10x^2 + 18x + 9$

③ $f(x) = x^5 + x^3 + 2x^2 - 12x + 8$

④ $f(x) = x^3 + 4x$

⑤ $f(x) = x^4 - 3x^3 + 6x^2 + 2x - 60$
if $1+3i$ is a zero

$1-3i$

$$\big(x - (1+3i)\big)\big(x - (1-3i)\big) =$$

Tools

- Rational Zero Test
- Intermediat Value Theorem
- Upper/lower bounds
- Descarte's Rule of Signs

Today's Topics (2.5)

p. 135 Fundamental Theorem of Algebra

p. 135 Linear Factorization Theorem

p. 137 Complex Zeros always occur in conjugate pairs

p. 137 Factors of polynomials

$$(2+3i)(2-3i) = 13$$

$$4 - \cancel{6i} + \cancel{6i} - 9i^2$$

$$(-1)$$

$$4 + 9 = 13$$

HW

sect. 2.5 # 2, 3, 5, 7, 9-16, 23, 25

Watch for situations like these:

- $x^4 + 10x^2 + 9 \rightarrow$ like $x^2 + 10x + 9$ $(x+9)(x+1)$ $\rightarrow$ so $(x^2+9)(x^2+1)$
- $x^2 - 25 \rightarrow$ Difference of Squares $\rightarrow$ so $(x+5)(x-5)$
- $x^4 - 625 \rightarrow$ Difference of Squares $\rightarrow$ so $(x^2+25)(x^2-25)$